

REMARKS

Claims 1 and 17-24 are amended as shown above, and new claim 27 is added. Support for the amendments can be found in the original claims and throughout the remainder of the specification. For example, support for the recitation in amended claim 24 that the particles are base soluble can be found on page 31, lines 9-15. Further, support for new claim 27 can be found on page 14, lines 12-15, among other portions of the specification. Thus, no new matter is added. As discussed below, the pending claims distinguish patentably over the cited art. Hence, reconsideration and allowance of the application are respectfully requested.

Allowable Claims

The Office Action deems claims 23 and 26 as allowable if rewritten in an independent format to include the limitations of base claim(s) on which they depend.

Accordingly, claim 23 is rewritten in independent format to include the limitations of claim 1. Claim 26, which depends on claim 24, is, however, retained in dependent format. As discussed below, amended claim 24 is patentable over the cited art, and hence so is claim 26.

Rejections Under 35 U.S.C. 112

Claims 20-23 are rejected as being indefinite for depending on composition claim 1, but reciting a method in their preambles.

Claim 20 and 23 are now rewritten as independent photoresist claims. Further, claims 21 and 22 are amended to recite “The photoresist of claim 1...” Hence, the rejections of these claims are overcome.

Rejections Under 35 U.S.C. 102

The Office Action rejects claims 1-22, 24 and 25 as being anticipated by U.S. Patent No. 4,336,319 of Nagashima.

Claim 1, as amended, recites a photoresist composition that includes a resin binder and an encapsulated material comprising *inorganic core particles that are at least partially coated*

with a moiety having a protected acidic group. The coated particles are distributed within the resin.

Nagashima is directed to light-solubilizable compositions that are suitable for producing lithographic printing plates. These compositions include o-quinonediazide compounds and alkali-soluble resins. In addition, the compositions can contain inorganic particles. Nagashima's inorganic particles are hydrophobic to ensure that they are "insoluble in solvents which dissolve o-quinonediazide compounds and alkali-soluble resin." See Nagashima col. 4, lines 10-15. For example, in some embodiments, particles of silicon dioxide are processed to replace 70% or more of their surface hydroxy groups with methyl groups in order to render them hydrophobic. See Example 1 of Nagashima.

Nagashima's particles are not coated with a moiety having a protected acidic group. Specifically, the hydroxy and methyl groups described in Example 1 of Nagashima are not protected acidic groups. The Examiner appears to reason that because the particles of Nagashima are contained within a resin having protected acidic groups, they are coated with such groups.

However, the present invention clearly calls for two separate components: a resin, and coated particles contained within the resin. That is, the particles of the invention have a coating of protected acidic groups even in absence of the resin. This is further clarified by the amendment to claim 1, which recites that the *coated* particles are distributed within the resin.

Hence, the claimed composition is distinct from those of Nagashima, and provides advantages not provided by Nagashima's compositions. In particular, the coating of the particles with protected acidic groups provides the mechanism for changing their solubility in basic solutions upon exposure to actinic radiation. More specifically, the coated particles can be designed to be normally substantially insoluble in basic solutions, e.g., in the absence of radiation exposure, and be rendered base soluble by removing the protecting groups of their coating, e.g., by acid generated in regions of the resist exposed to actinic radiation.

The present invention imparts physical strength to the unexposed portions of a photoresist containing such particles while allowing the exposed portions to be readily dissolved in basic solutions. In contrast, the particles of Nagashima are hydrophobic, and remain insoluble in basic solutions even after exposing the compositions containing them to actinic radiation.

For these reasons, claim 1, and claims 2-16, 21 and 22, that depend either directly or indirectly on claim 1, are patentable over Nagashima.

Similar arguments apply to establish that independent method claims 17, 18, and 19 also distinguish patentably over Nagashima. In particular, each of these claims includes a step of coating a substrate with a photoresist comprising a *resin and particles that are at least partially coated with protected acidic groups*. As discussed above, Nagashima does not disclose such photoresist compositions.

Independent claim 20 recites a photoresist composition that includes a resin binder, and an encapsulated material comprising inorganic core particles that are at least partially coated with a moiety having a protected acidic group. The moiety is attached to the particles by one or more *covalent bonds*.

As discussed above, the particles of Nagashima do not have coatings of a moiety having protected acidic groups. Further, even if one considers that the protected acidic groups of the resin provide coating for the particles, as Examiner does, these groups of the resin are not covalently bonded to the surface of the particles. Thus, claim 20 is distinguishable over the teachings of Nagashima.

Independent claim 24 recites a positive photoresist that includes a resin binder and an encapsulated inorganic material comprising core particles having an average size ranging from about 1 nm to about 50 nm, wherein the particles are *base-soluble* and the photoresist is sufficiently base soluble upon activation by radiation to function as a positive resist.

In contrast, the particles of Nagashima are not base-soluble. In fact, Nagashima's particles are hydrophobic and are not soluble in solvents that dissolve alkali-soluble resins. This distinction renders Nagashima's composition ill-suited, at best, for use as a semiconductor resist

because even after exposure to radiation and application of a basis solution to the exposed areas, the particles in the exposed areas remain on the substrate. In other words, clearance of the exposed areas is not achieved.

Thus, claim 24, and claims 25 and 26 that depend either directly or indirectly on it, are patentable.

New Claim

New claim 27 recites a photoresist composition that includes a resin binder, and an encapsulated material comprising inorganic core particles that are at least partially coated with a moiety having a protected acidic group, wherein the moiety is adsorbed onto the particles.

Again, Nagashima does not disclose particles that are at least partially *coated with a moiety having a protected acidic group*, where the moiety is adsorbed on the particles.

Thus, claim 27 distinguishes patentability over Nagashima.

CONCLUSION

In view of the above amendments and remarks, Applicant respectfully requests reconsideration and allowance of the application. If there are any remaining issues, Applicant invites the Examiner to call the undersigned at (617) 439-2514 in order to expedite the prosecution of this case.

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Respectfully submitted,

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